REMARKS

The application has been reviewed in light of the Office Action mailed October 21, 2003. At the time of the Office Action, Claims 1-36 were pending in this application. Claims 1-36 were rejected.

Rejections under 35 U.S.C. § 103(a)

Claims 1-36 were rejected by the Examiner under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,014,193 issued to Kazuki Taira et al., ("Taira") in view of U.S. Patent No. 5,892,493 issued to Kunio Enami et al., ("Enami"). Applicant respectfully traverses the rejections and submits that the references relied upon do not teach or suggest, individually or in combination, what is being claimed.

In a liquid crystal display (LCD), alternating positive and negative voltages are applied to pixels in the LCD matrix that are representative of gray scales desired for each pixel. Alternating positive and negative voltages are required so that the LCD glass does not become electrostatically charged which would cause image sticking problems. Enami teaches precharging rows and/or columns of pixels to the an "average" voltage value having the same voltage polarity that the final pixel voltage values will have when subsequently written to each pixel. Enami teaches the average voltage value to be half way between maximum and minimum voltage values representing white and black (or visa-versa). Enami does not teach or suggest calculating "an average of the sum of the final voltage values" to be written to the pixels. While Enami and the present invention both precharge a matrix of pixels to the same voltage polarity that will be written during the next frame of video pixel (either plus or minus), Enami can only prewrite a voltage value half way between the possible maximum and minimum voltage that could be written to each pixel. This is better than having to charge from a prior opposite polarity

voltage, but Enami does not teach the essence of the present invention which is precharging with a dynamically calculated average of the sum of the final voltage values that will be applied to the pixels during the next video frame of the LCD. If the sub-matrix of pixels will be written predominately "black" then the present invention will precharge the sub-matrix to a predominately black voltage level, conversely if the sub-matrix of pixels will be written predominately "white" then the present invention will precharge the sub-matrix to a predominately white voltage level. This is of great advantage and is neither taught nor suggested in either of the references relied upon.

The Taira reference teaches a fairly standard active matrix liquid crystal display (AMLCD) structure. The Enami reference teaches pre-charging data lines to the same voltage polarity and an "average" value of voltage before the actual grayscale voltage is applied to the individual pixels (a pixel being a capacitor with liquid crystal material between the capacitor plates). Enami teaches that the average value of the pre-charge voltage be approximately one-half of the voltage of the difference between maximum and minimum voltages that may be applied to the pixel capacitors. *See* Figure 9A. The Enami reference states:

> Thus, a precharge voltage ($+V_1$ or $-V_1$) with the same polarity as that of the data voltage applied next time is applied to a data line before application of data voltage by the data line groups A-D. Therefore, if the data voltage is applied through the data line driver 40 and the multiplexer 38, the potential on each data line is changed to a value substantially equal to the applied precharge voltage, or a value close to the data voltage applied next time (an average value of data voltage being applied if the range of data voltage is +2.5 V--2.5 V, and the precharge voltage is +1.25 V or -1.25 V).

Enami, Column 9, lines 32-42.

> Thus, as in the first embodiment, the precharge voltage with the same polarity as the data voltage applied to each data line next time ($+V_1$ or $-V_1$) is applied to each of the data line groups A-D.

> The potential on each data line when the data voltage is applied is changed to a value close to the data voltage being applied (for example, when the data voltage ranges +2.5 V--2.5 V, and the precharge voltage is +1.25 V or -1.25 V, a value close to the average value of the data voltage being applied), the precharge voltage is applied between the electrode pair for a display cell connected to any one of data lines in the data line groups B-D, and, when the data voltage is applied, the voltage between the electrode pair of the display cell becomes a value substantially matching the precharge voltage.

Enami, Column 13, lines 4-17.

Enami does not teach or suggest prewriting to coarse groups (sub-matrices) voltage values that are the ***calculated*** average of the actual "next frame" pixel voltage values of those sub-matrices. A video frame created on an LCD matrix comprises a plurality of shades of gray that may range from "dark" to "white." Each adjacent pixel may be at a slightly different "grayshade" but probably will still be close in value. Pixels far apart, *e.g.*, even on the same row or column of the display may be at opposite ends of the gray scale. A new, novel and non-obvious feature of the present invention is that calculations are made for an actual average voltage value of the required grayscale voltage values (what is required to display the video image) to be displayed on the next frame (before the LCD is "flashed") for each contiguous group of pixels which are arranged in the sub-matrices. Thus, the present invention may calculate an average voltage value that is "dark" for at least one sub-matrix of pixels and another average voltage value that is "white" for at least another one sub-matrix of pixels, including any gray shades in-between. As can be readily seen, this new, novel and non-obvious feature greatly enhances the speed of operation and resolution quality of the LCD over all grayscale ranges.

The Enami reference further teaches charging the entire LCD pixel matrix to a positive or negative predefined "average value" voltage (Figure 4A), alternating row positive and negative predefined "average value" voltages (Figure 4B), alternating pixel positive and negative

predefined "average value" voltages (Figure 4C), and alternating column positive and negative predefined "average value" voltages (Figure 4D). The present invention pre-charges sub-matrices of a plurality of adjacent pixels to a ***dynamically calculated*** average of the next frame pixel voltage values. Therefore, Applicant respectfully submits that the Enami reference teaches away from what is being claimed in the present invention.

The Enami reference teaches a precharging controller (44), shown in Figure 1, that supplies an average voltage value for pre-charging the LCD. However, Enami only teaches a fixed precharge voltage value, not one that is dynamically calculated from the next frame of final pixel voltage values, nor does it teach applying the dynamically calculated average voltage values to a sub-matrix of pixels, *e.g.*, M x N, where M and N are subgroups of the total LCD pixel matrix. Enami states:

> The precharge voltage $+V_1$ may be a value of one-half of the maximum value of data voltage which is described later, and the precharge voltage $-V_1$ may be a value of one-half of the minimum value of data voltage. As an example, if the maximum value of data voltage is +2.5 V, and the minimum value is -2.5 V, the precharge voltage $+V_1$ =+1.25 V, $-V_1$ = -1.25 V (that is, average values of applied data voltage). Although the voltage switching circuit 46 is schematically shown as a switch in FIG. 1, it actually includes a switching element such as a transistor.

Enami, Column 8, lines 24-33.

Modification unwarranted by the disclosure of a reference is improper. *Carl Schenck, A.G. v. Norton Corp.*, 713 F.2d 782, 787, 218 U.S.P.Q. 698, 702 (Fed. Cir. 1983).

Applicant respectfully traverses the following assertions made by the examiner:

> "It would have been obvious to one of ordinary skill in the art to incorporate the precharging controller of Enami et al into that of Taira et al as the logic circuits of Taira et al would be able to precharge as well." Office Action, pp. 3-5. (all occurrences)

Applicant respectfully requests the examiner to submit documents supporting these assertions of obviousness in an affidavit pursuant to MPEP 2144.03.

Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the combination. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984). When the patented invention is made by combining known components to achieve a new system, the prior art must provide a suggestion or motivation to make such a combination. *See Northern Telecom Inc. v. Datapoint Corp.* 908 F.2d 931, 934, 15 U.S.P.Q.2d 1321, 1323 (Fed.Cir.), cert. denied, 498 U.S. 920, 111 S.Ct. 296, 112 L.Ed.2 250 (1990); *In re Geiger*, 815 F.2d 686, 688, 2 U.S.P.Q.2d 1276, 1278 (Fed. Cir. 1987) (obviousness cannot be established by combining pieces of prior art absent some "teaching, suggestion or incentive supporting the combination"). The motivation to combine references cannot come from the invention itself. *See In re Oetiker*, 977 F.2d 1443, 1447, 24 U.S.P.Q.2d 1443, 1446 (Fed. Cir. 1992).

Thus, the references relied upon do not teach or suggest, individually or in combination:

"Logic circuits for calculating an average voltage value to be applied to each of the plurality of sub-matrices before applying final voltage values to each of the pixels of each of the sub-matrices, wherein the average voltage value is an average of the sum of the final voltage values; and logic circuits for controlling the plurality of column switches and the plurality of row switches so that each sub-matrix may be precharged with its calculated average voltage value, then each of the pixels charged with the final voltage value representative of that portion of the video frame represented by that pixel" as recited in independent claim 1.

"Calculating average voltage values for each of the sub-matrices of pixels based upon an average of the sum of final voltage values for the pixels of each of the sub-matrices; writing the calculated average voltage values to the pixels in each of the sub-matrices; and writing the final voltage values to each of the pixels" as recited in independent claims 15 and 17.

"Writing the calculated average voltage values to the pixels in each of the sub-matrices; writing the odd row final voltage values to each of the adjacent odd and even rows of pixels; and writing the even row final voltage values to each of the even rows of pixels" as recited in independent claim 17.

"Calculating average voltage values for each of the sub-matrices of pixels based upon an average of the sum of final voltage values for the pixels of each of the sub-matrices; writing the calculated average voltage values to the pixels in each of the sub-matrices; writing the even row final voltage values to each of the adjacent odd and even rows of pixels; and writing the odd row final voltage values to each of the odd rows of pixels" as recited in independent claim 19.

"Logic circuits for calculating an average voltage value to be applied to each of the plurality of sub-matrices before applying final voltage values to each of the pixels of each of the sub-matrices, wherein the average voltage value is an average of the sum of the final voltage values; and logic circuits for controlling the plurality of column switches and the plurality of row switches so that each sub-matrix may be precharged with its calculated average voltage value, then each of the pixels charged with the final voltage value representative of that portion of the video frame represented by that pixel" as recited in independent claim 21.

Claims 2-14 and 36 depend from independent claim 1, claim 16 depends from independent 15, claim 18 depends from independent claim 17, claim 20 depends from

independent claim 19, claims 22-35 depend from independent claim 21, and contain all limitations thereof.

Applicant respectfully submits that no amendments have been made to the pending claims for the purpose of overcoming any prior art rejections that would restrict the literal scope of the claims or equivalents thereof.

Applicant reserves the right to subsequently take up prosecution on the claim as originally filed in this or appropriate continuation, continuation-in-part and/or divisional applications.

Applicant respectfully requests reconsideration in light of the remarks contained herein.

Applicant respectfully requests withdrawal of all objections and rejections, and that there be an early notice of allowance.

SUMMARY

In light of the above remarks, Applicant respectfully submits that the application is in condition for allowance and early notice of the same is earnestly solicited. Should the Examiner have any questions, comments or suggestions in furtherance of the prosecution of this application, the Examiner is invited to contact the attorney of record by telephone or facsimile.

Applicant believes that there are no fees due in association with the filing of this Response. However, should the Commissioner deem that any fees are due, including any fees for extensions of time, Applicant respectfully requests that the Commissioner accept this as a Petition Therefor, and direct that any and all fees due are charged to Baker Botts L.L.P. **Deposit Account No. 02-0383,** *(formerly Baker & Botts, L.L.P.)* **Order Number 068363.0108.**

Respectfully submitted,

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